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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/705,728	11/10/2003	William M. Hiatt	2269-5558E US (99-0253.04	5029

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EXAMINER	
KOSOWSKI, ALEXANDER J	

ART UNIT	PAPER NUMBER
2125	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/705,728	HIATT ET AL.	
	Examiner	Art Unit	
	Alexander J. Kosowski	2125	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 May 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,9,13-18,21-24,28,29,32 and 33* is/are rejected.

7)☒ Claim(s) *3-8,10-12,19,20,25-27,30 and 31* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

IN THE CLAIMS:

The status of each claim that has been introduced in the above-referenced application is identified in the ensuing listing of the claims. This listing of the claims replaces all previously submitted claims listings.

1. (Previously Presented) A method for supporting a substrate during programmed material consolidation of one or more objects on or adjacent to the substrate, comprising:
securing the substrate in position over a support surface;
preventing unconsolidated material from contacting a bottom surface of the substrate as one or more objects are being fabricated on or adjacent to the substrate by a programmed material consolidation process.

2. (Original) The method of claim 1, wherein securing the substrate in position over the support surface is effected by positioning the substrate at least partially within a receptacle formed by at least one raised element.

3. (Previously Presented) The method of claim 2, wherein securing the substrate in position over the support surface includes disposing a retention lip extending laterally from the at least one raised element over at least a portion of a periphery of a major surface of the substrate.

4. (Original) The method of claim 3, wherein the retention lip contacts at least the portion of the periphery of the substrate.

5. (Original) The method of claim 4, further comprising:
positioning at least one spacer between the support surface and the bottom surface of the substrate.

6. (Original) The method of claim 3, wherein disposing the retention lip comprises forming the retention lip by programmed material consolidation processes.

7. (Original) The method of claim 6, wherein forming the retention lip by programmed material consolidation processes includes employing stereolithography.

8. (Original) The method of claim 3, wherein disposing the retention lip comprises positioning a preformed retention lip over at least a portion of a periphery of the substrate.

9. (Previously Presented) The method of claim 2, wherein positioning the substrate comprises positioning the substrate within a receptacle formed by at least one raised element that substantially surrounds the substrate.

10. (Original) The method of claim 9, further comprising:
disposing at least one extension element on an upper surface of the at least one raised element.

11. (Original) The method of claim 10, wherein disposing the at least one extension element comprises fabricating the at least one extension element by programmed material consolidation processes.

12. (Original) The method of claim 11, wherein forming the at least one extension element by programmed material consolidation processes includes employing stereolithography.

13. (Original) The method of claim 2, wherein securing the substrate in position over the support surface includes applying a negative pressure to the bottom surface of the substrate.

14. (Original) The method of claim 13, wherein securing the substrate in position over the support surface further includes positioning the substrate over a sealing element with a peripheral portion of the bottom surface of the substrate contacting the sealing element.

15. (Original) The method of claim 14, further comprising:
breaking a seal between the sealing element and the bottom surface of the substrate.

16. (Original) The method of claim 1, wherein securing the substrate in position over the support surface includes applying a negative pressure to the bottom surface of the substrate.

17. (Original) The method of claim 1, further comprising:
removing the substrate from the support surface.

18. (Original) The method of claim 17, wherein removing the substrate comprises applying a positive pressure to the bottom surface of the substrate.

19. (Original) The method of claim 18, wherein applying a positive pressure to the bottom surface of the substrate includes creating a circulating air flow beneath the bottom surface of the substrate.

20. (Original) The method of claim 19, wherein creating a circulating air flow beneath the bottom surface of the substrate causes the substrate to hover over the support surface.

21. (Original) The method of claim 17, wherein removing the substrate comprises applying force to the bottom surface of the substrate.

22. (Original) A programmed material consolidation method, comprising:
positioning at least one substrate in a receptacle of a retention system including a raised periphery that laterally surrounds the at least one substrate;
introducing unconsolidated material onto a surface of the at least one substrate; and
programmably consolidating at least portions of the unconsolidated material.

23. (Original) The programmed material consolidation method of claim 22, wherein introducing unconsolidated material comprises forming a layer of unconsolidated material of desired thickness over the at least one substrate, then selectively consolidating regions of the layer.

24. (Original) The programmed material consolidation method of claim 23, wherein introducing unconsolidated material further comprises repeating the acts of forming and selectively consolidating at least once.

25. (Original) The programmed material consolidation method of claim 22, wherein introducing unconsolidated material includes substantially filling the receptacle with unconsolidated material.

26. (Original) The programmed material consolidation method of claim 25, further comprising:
planarizing a surface of the unconsolidated material within the receptacle.

27. (Original) The programmed material consolidation method of claim 26, wherein planarizing is effected with at least one of a meniscus blade and an air knife.

28. (Original) The programmed material consolidation method of claim 22, wherein introducing unconsolidated material comprises spraying unconsolidated material onto at least a portion of the at least one substrate.

29. (Original) The programmed material consolidation method of claim 22, wherein introducing unconsolidated material comprises dispensing the unconsolidated material in a laminar flow.

30. (Original) The programmed material consolidation method of claim 29, wherein dispensing is effected without introducing unconsolidated material onto structures that protrude from the at least one substrate.

31. (Currently Amended) The programmed material consolidation method of claim 22, further comprising:

removing excess unconsolidated material from the receptacle following the ~~progammably~~ programmably consolidating.

32. (Original) The programmed material consolidation method of claim 22, further comprising:

preventing unconsolidated material from contacting a bottom surface of the at least one substrate while introducing unconsolidated material into the receptacle.

33. (Original) The programmed material consolidation method of claim 22, further comprising:

removing the at least one substrate from the receptacle following programmably consolidating at least portions of the unconsolidated material.

DETAILED ACTION

1) Claims 1-33 are presented for examination in light of the amendment filed 5/25/06.

Allowable Subject Matter

2) Claims 3-8, 10-12, 19-20, 25-27 and 30-31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Referring to claims 3, 10 and 30, neither Jensen (USPGPUB 2001/0032111) nor Zhang (U.S. Pat 6,158,346), together or in combination with the prior art of record explicitly teach a method for supporting a substrate during programmed material consolidation comprising disposing a retention lip extending laterally from a raised element over at least a portion of a periphery of a major surface of a substrate, disposing an extension element on an upper surface of a raised element, dispensing unconsolidated material without introducing unconsolidated material onto structures that protrude from the substrate, applying a positive pressure to the bottom surface of the substrate including creating a circulating air flow beneath the bottom surface of the substrate, introducing unconsolidated material including substantially filling the receptacle with unconsolidated material, nor removing excess unconsolidated material from the receptacle following the programmably consolidating, in combination with the remaining elements or features of the claimed invention.

Referring to claims 4-8,11-12, 20 and 26-27, the claims are dependent on claims 3, 10, 19 and 25 above, respectively, and would therefore also be allowable.

Claim Rejections - 35 USC § 103

3) The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4) Claims 1-2, 9, 17-18, 21-24, 28-29 and 32-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sanders, Jr et al (U.S. Pat 5,506,607), further in view of Tischler (U.S. PGPUB 2003/0114016).

Referring to claim 1, Sanders teaches a method for supporting a substrate during programmed material consolidation comprising securing the substrate in position over a support surface (col. 13 line 40 through col. 14 line 3) as one or more objects are being fabricated on or adjacent to the substrate by a programmed material consolidation process (col. 12 line 57 through col. 13 line 28). However, Sanders does not explicitly teach preventing unconsolidated material from contacting a bottom surface of the substrate.

Tischler teaches a wafer carrier for use in semiconductor processing including deposition processes (Paragraph 0030), which comprises a dimensionally close fit recess including a retention lip for holding a substrate snugly (Paragraphs 0032 and 0065 and 0077, whereby it is noted that a substrate held in this type of carrier would not be susceptible to deposits contacting its bottom surface).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to hold a substrate such that unconsolidated material is prevented from contacting a bottom surface of the substrate in the invention taught by Sanders since a dimensionally close fit

substrate carrier would permit a wafer carrier to hold a substrate in place through all processes (Tischler, Paragraph 0051), since this would allow a substrate to fit snugly and frictionally within the recess of a wafer carrier (Tischler, Paragraph 0065), and since it is noted that it is desirable to prevent unconsolidated material from contacting the bottom of a substrate since this would minimize the amount of cleaning and contamination a substrate is exposed to.

Referring to claims 2 and 9, Sanders teaches the above. However, Sanders does not explicitly teach that securing the substrate in position over the support surface is effected by positioning the substrate at least partially within a receptacle formed by at least one raised element, nor that positioning the substrate comprises positioning the substrate within a receptacle formed by at least one raised element that substantially surrounds the substrate.

Tischler teaches a wafer carrier for use in semiconductor processing including deposition processes (Paragraph 0030), which comprises a dimensionally close fit recess including a retention lip surrounding the substrate for holding a substrate snugly (Paragraphs 0032 and 0065 and 0077 and Figure 2).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to position the substrate at least partially within a receptacle formed by at least one raised element that substantially surrounds the substrate in the invention taught by Sanders since a dimensionally close fit substrate carrier would permit a wafer carrier to hold a substrate in place through all processes (Tischler, Paragraph 0051), and since this would allow a substrate to fit snugly and frictionally within the recess of a wafer carrier (Tischler, Paragraph 0065).

Referring to claims 17-18 and 21, Sanders teaches removing the substrate from the support surface by applying a positive pressure force to the bottom surface of the substrate (col. 14 lines 15-47, whereby a shearing force is a positive pressure force).

Referring to claim 22, Sanders teaches a programmable material consolidation method comprising positioning at least one substrate (col. 13 line 40 through col. 14 line 3), introducing unconsolidated material onto a surface of the substrate and programmably consolidating at least portions of the unconsolidated material (col. 19 line 64 through col. 20 line 58, whereby powder may be used). However, Sanders does not explicitly teach that the substrate is positioned in a receptacle of a retention system including a raised periphery that laterally surrounds the at least one substrate.

Tischler teaches a wafer carrier for use in semiconductor processing including deposition processes (Paragraph 0030), which comprises a dimensionally close fit recess including a retention lip laterally surrounding a substrate for holding the substrate snugly (Paragraphs 0032 and 0065 and 0077 and Figure 2).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to position the substrate in a receptacle of a retention system including a raised periphery that laterally surrounds the at least one substrate in the invention taught by Sanders since a dimensionally close fit substrate carrier would permit a wafer carrier to hold a substrate in place through all processes (Tischler, Paragraph 0051), and since this would allow a substrate to fit snugly and frictionally within the recess of a wafer carrier (Tischler, Paragraph 0065).

Referring to claims 23-24, Sanders teaches that introducing unconsolidated material comprises forming a layer of unconsolidated material of a desired thickness over the at least one

substrate, then selectively consolidating regions of the layer and repeating the acts of forming and selectively consolidating at least once (col. 19 line 64 through col. 20 line 58, whereby multiple layers are formed).

Referring to claim 28, Sanders teaches introducing unconsolidated material comprises spraying unconsolidated material onto at least a portion of the substrate (col. 19 line 64 through col. 20 line 58).

Referring to claim 29, Sanders teaches that dispensing may comprise a laminar flow (col. 20 lines 31-52).

Referring to claim 32, Sanders teaches the above. However, Sanders does not explicitly teach preventing material from contacting the bottom surface of a substrate.

Tischler teaches a wafer carrier for use in semiconductor processing including deposition processes (Paragraph 0030), which comprises a dimensionally close fit recess including a retention lip for holding a substrate snugly (Paragraphs 0032 and 0065 and 0077, whereby it is noted that a substrate held in this type of carrier would not be susceptible to deposits contacting its bottom surface).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to hold a substrate such that unconsolidated material is prevented from contacting a bottom surface of the substrate in the invention taught by Sanders since a dimensionally close fit substrate carrier would permit a wafer carrier to hold a substrate in place through all processes (Tischler, Paragraph 0051), since this would allow a substrate to fit snugly and frictionally within the recess of a wafer carrier (Tischler, Paragraph 0065), and since it is noted that it is desirable to

prevent unconsolidated material from contacting the bottom of a substrate since this would minimize the amount of cleaning and contamination a substrate is exposed to.

Referring to claim 33, Sanders teaches removing the at least one substrate from the receptacle following programmably consolidating at least portions of the unconsolidated material (col. 14 lines 15-47).

5) Claims 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sanders, further in view of Tischler, further in view of Jensen, JR. et al (U.S. PGPUB 2001/0032111).

Referring to claims 13-16, Sanders and Tischler teach the above. However, they do not explicitly teach that securing the substrate in position over the support surface includes applying a negative pressure to the bottom surface of the substrate, positioning the substrate over a sealing element with a peripheral portion of the bottom surface of the substrate contacting the sealing element, nor breaking a seal between the sealing element and the bottom surface of the substrate.

Jensen teaches a substrate carrier comprising a recess for holding a substrate (Paragraph 0042), comprising a vacuum for exerting negative pressure on a substrate to hold it in place (Paragraph 0042), as well as a sealing element contacted by the bottom surface of a substrate (Paragraph 0043, whereby the sealing element would be broken upon removing the substrate).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to apply negative pressure on the bottom surface of a substrate and to utilize a sealing element in the invention taught above since a vacuum would allow a carrier to hold a wafer in place during processing (Jensen, Paragraph 0042), and since a sealing element would prevent

ingress and trapping of particles between the sealing element and the back surface of a substrate (Jensen, Paragraph 0043).

Response to Arguments

6) Applicant argues generally on page 8 that Sanders "does not teach or suggest that the system thereof may be used to fabricate a model on a substrate". Examiner disagrees, and notes col. 12 line 57 through col. 14 line 11 of Sanders, which clearly teaches building a model on a substrate as noted above.

Applicant argues on page 8 that "without the benefit of hindsight...one of ordinary skill in the art wouldn't have been motivated to combine teachings from Sanders and Tischler in the manner that has been asserted". In response, examiner notes that it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Applicant argues on page 8 that "Sanders lacks any teaching or suggestion that the 3-D modeling apparatus thereof may be used to fabricate structures on substrates". In response, examiner again notes that col. 12 line 57 through col. 14 line 11 of Sanders teaches fabricating structures on substrates as claimed. Sanders teaches that 3-D models are built on a layer-by-layer basis, and that they are built on a substrate secured to the device.

Applicant argues on page 9 that there "would be no reason for one of ordinary skill in the art to use the wafer carrier of Tischler on or substitute it for the support 10 of the 3-D modeling

apparatus of Sanders". In response, examiner notes the motivation to combine given in the rejection above, notably that it would have been obvious to one skilled in the art at the time the invention was made to hold a substrate such that unconsolidated material is prevented from contacting a bottom surface of the substrate in the invention taught by Sanders since a dimensionally close fit substrate carrier would permit a wafer carrier to hold a substrate in place through all processes (Tischler, Paragraph 0051), since this would allow a substrate to fit snugly and frictionally within the recess of a wafer carrier (Tischler, Paragraph 0065), and since it is noted that it is desirable to prevent unconsolidated material from contacting the bottom of a substrate since this would minimize the amount of cleaning and contamination a substrate is exposed to.

Applicant argues with reference to claim 18 that "neither Sanders nor Tischler teaches or suggests applying a positive pressure to a bottom surface of a substrate to remove the substrate from a support surface". In response, examiner notes that a "shearing force" as stated in the specification of Sanders is considered a positive force.

Applicant argues with reference to claim 21 that "Sanders and Tischler both lack any teaching or suggestion of applying a force to a bottom surface of a substrate to remove the same from a support surface". In response, examiner notes that a "shearing force" as stated in the specification of Sanders is considered applying a force.

Applicant argues with reference to claims 23-24 that there is no teaching or suggestion "of forming a layer of unconsolidated material or selectively consolidating material" or "forming and selectively consolidating regions of a layer once". In response, examiner notes col. 19 line

64 through col. 20 line 58 of Sanders, whereby powder may be applied in layers and then selectively consolidated.

Applicant argues with regard to claim 29 that "Claim 29 is drawn to a method that includes dispensing unconsolidated material in a laminar flow, whereas the teachings and suggestions of Sanders are limited to ejection of jetting beads, or droplets". In response, examiner notes col. 20 lines 31-52 of Sanders, and notes that a laminar flow may be defined as a smooth fluid flow. Examiner interprets a consistent ejecting of droplets to be a type of smooth fluid flow.

Finally, with regard to claims 13-16, applicant again argues the use of hindsight, as well as argues that "it is not understood how or why one of ordinary skill in the art would have been motivated to fabricate a polishing pad in accordance with the teachings of Sanders on a substrate supported by the wafer carrier of Tischler or Sanders". In response, examiner again notes that it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). In addition, examiner notes it would have been obvious to one skilled in the art at the time the invention was made to combine the teachings of Tischler with those of Sanders since, as noted above, a dimensionally close fit substrate carrier would permit a wafer carrier to hold a substrate in place through all processes (Tischler, Paragraph 0051), since this would allow a substrate to fit snugly and frictionally within the recess of a wafer carrier (Tischler, Paragraph 0065), and since it is noted

that it is desirable to prevent unconsolidated material from contacting the bottom of a substrate since this would minimize the amount of cleaning and contamination a substrate is exposed to.

Conclusion

7) **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8) Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander J Kosowski whose telephone number is 571-272-3744. The examiner can normally be reached on Monday through Friday, alternating Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Picard can be reached on 571-272-3749. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. In addition, the examiner's RightFAX number is 571-273-3744.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2100.

Alexander J. Kosowski
Patent Examiner
Art Unit 2125

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